P42390P13589

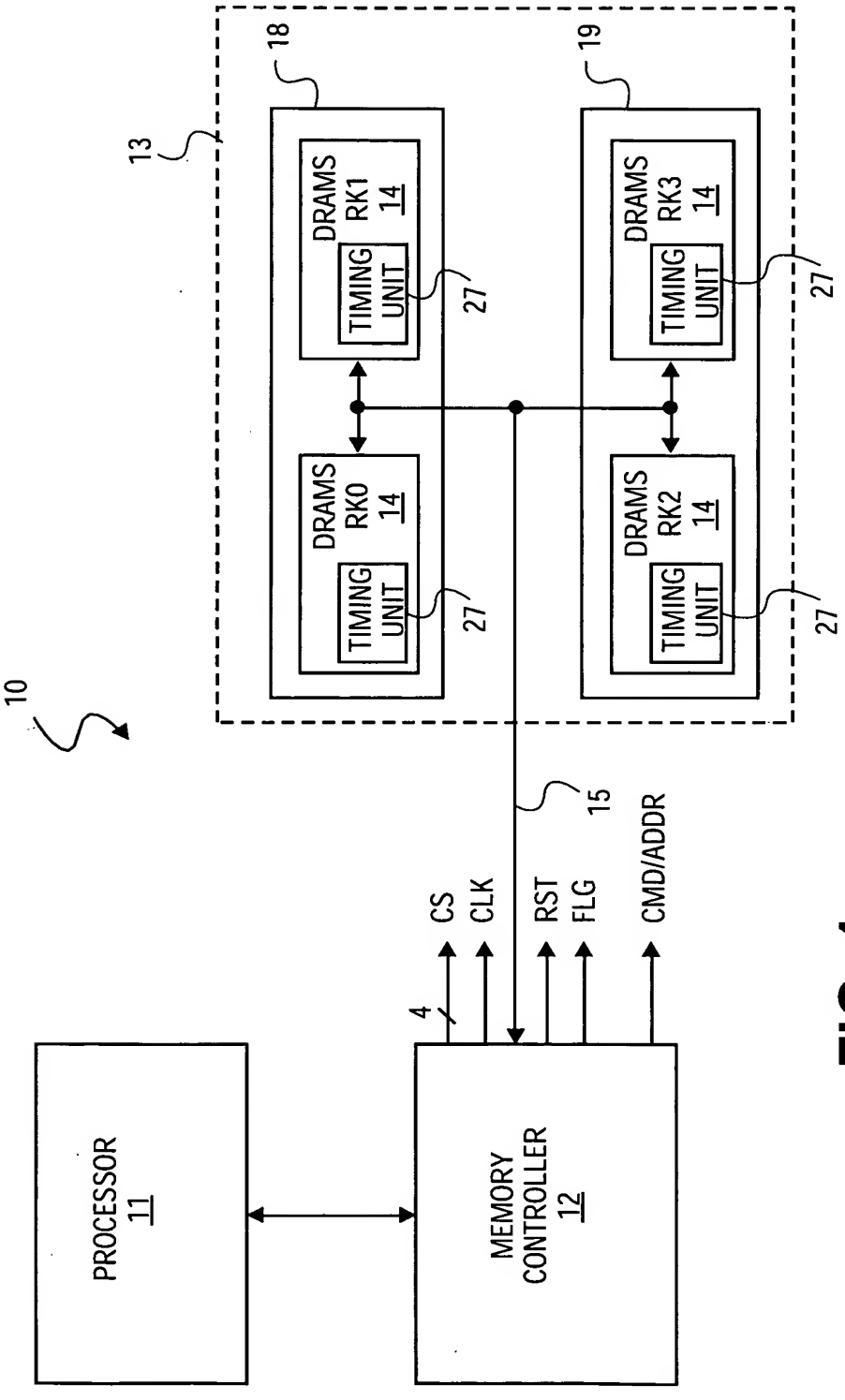

FIG. 1

Title: Apparatus and Method To Track Command Signal Occurrence For Dram Data Transfer
Inventor(s): Narendra Khandekar, Michael Williams, David Howard
Atty. Docket No.: 42390P13589

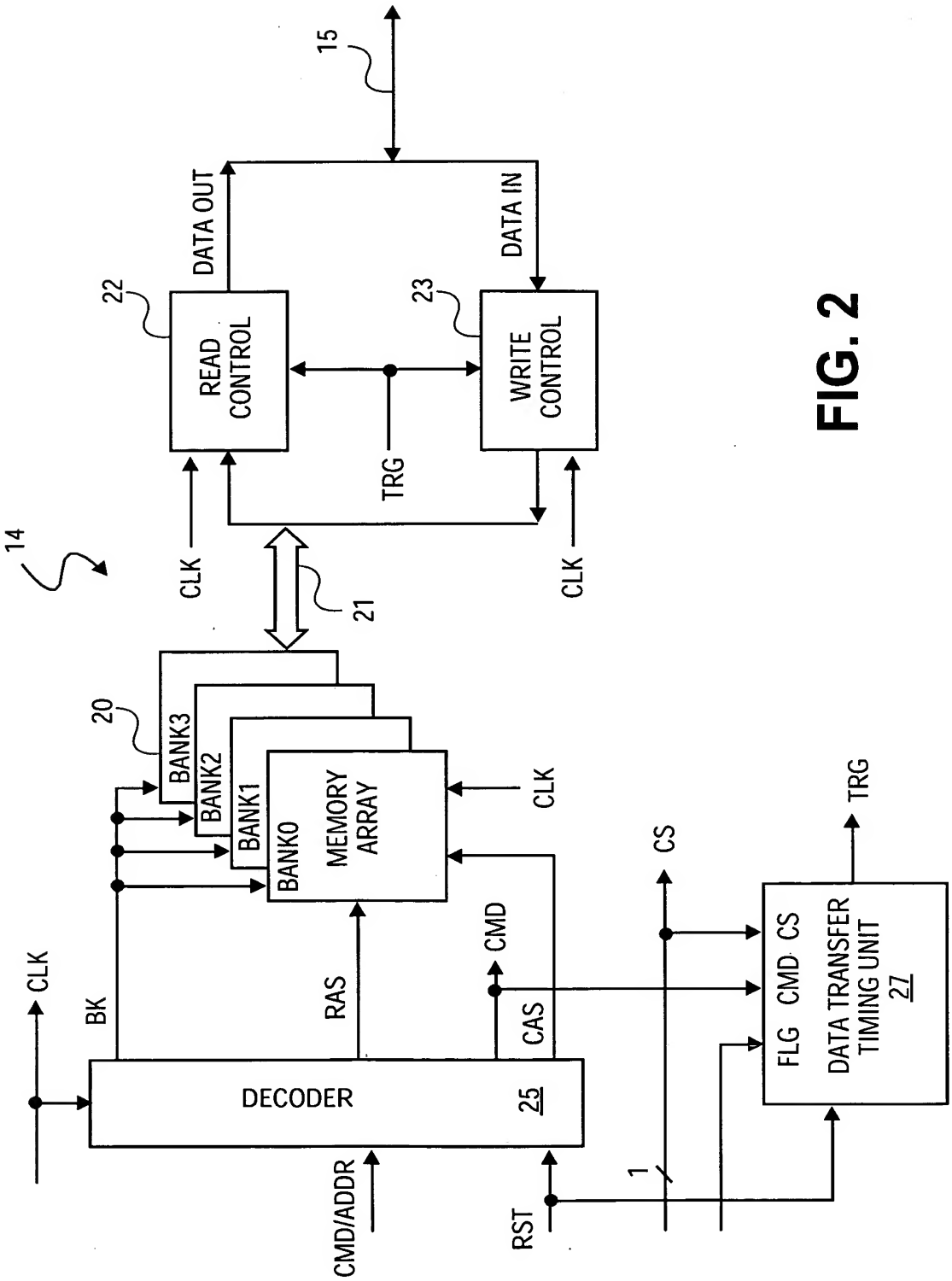

FIG. 2

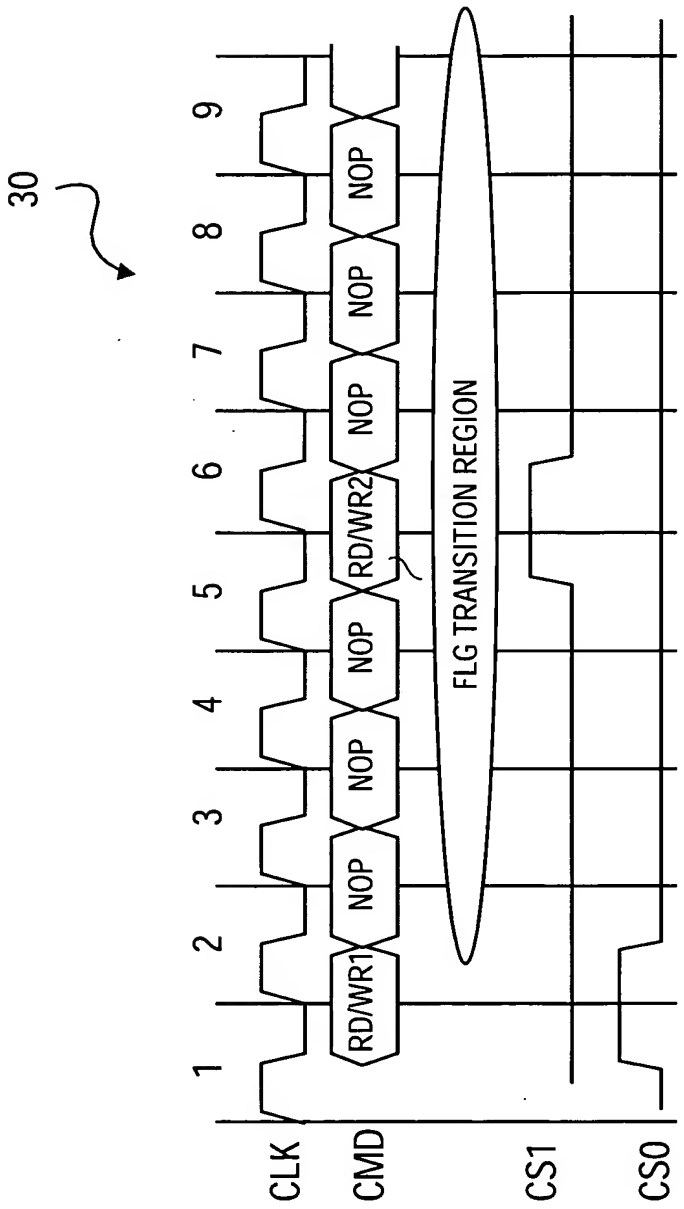
30
1
2
3
4
5
6
7
8
9
CLK
CMD
CS1
CS0
RD/WR1
NOP
NOP
NOP
NOP
RD/WR2
NOP
NOP
NOP
FLG TRANSITION REGION

FIG. 3

P05589.042900

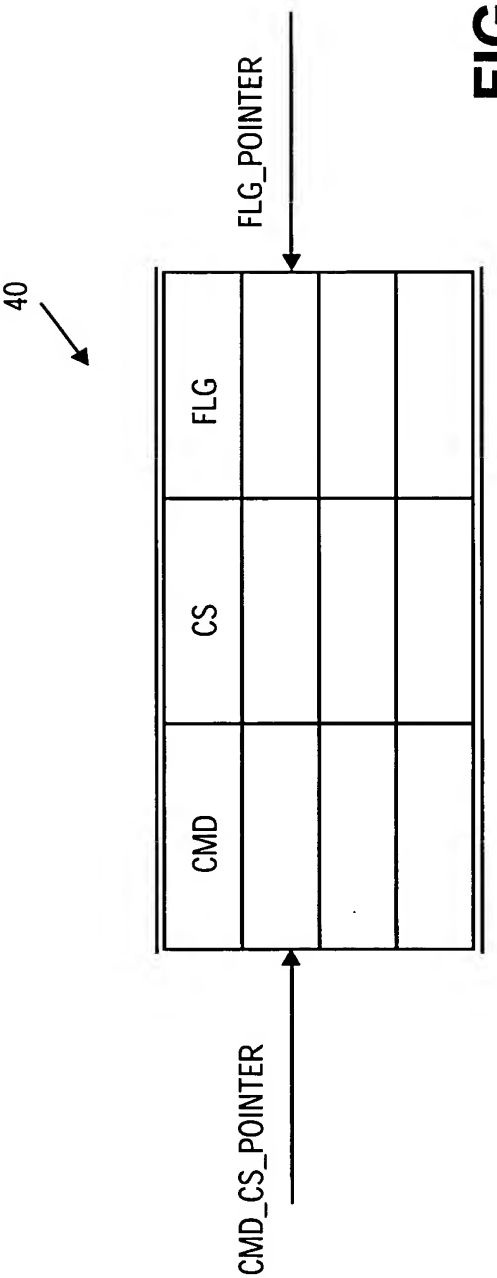

FIG. 4

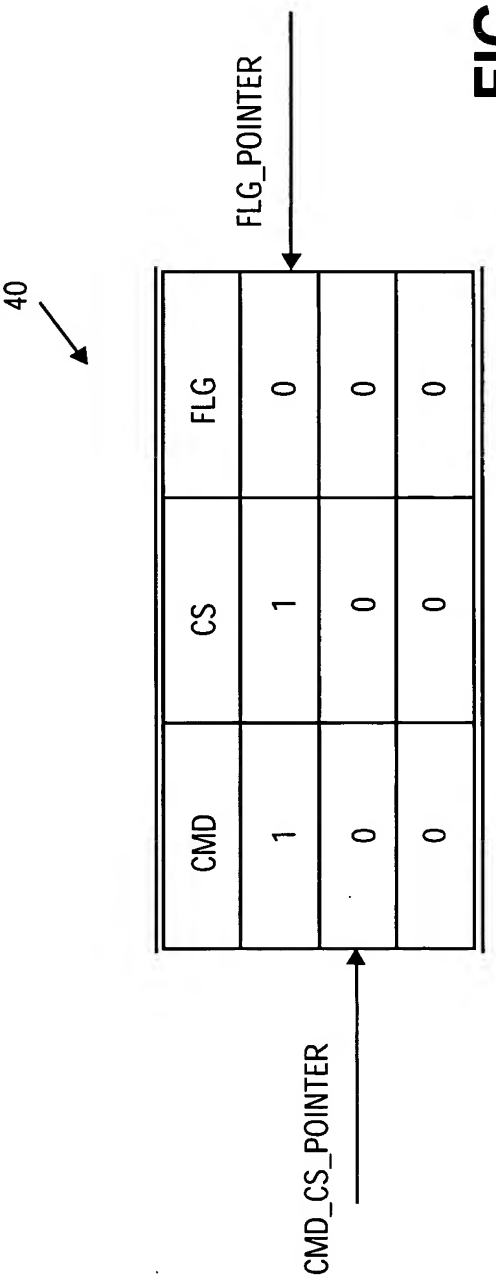

FIG. 5

P0959959 . 042902

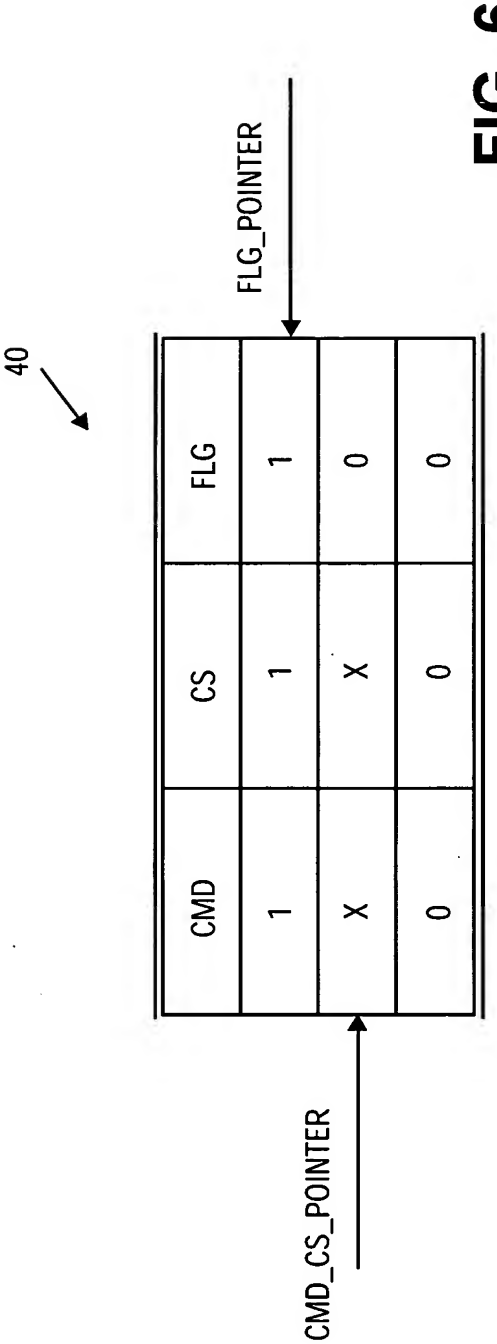

FIG. 6

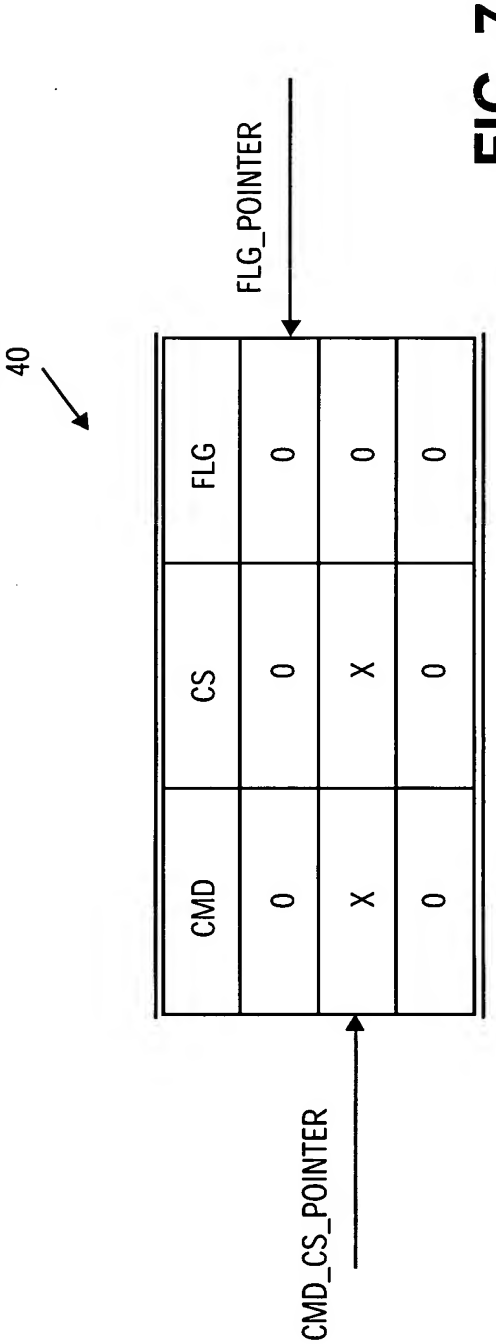

FIG. 7

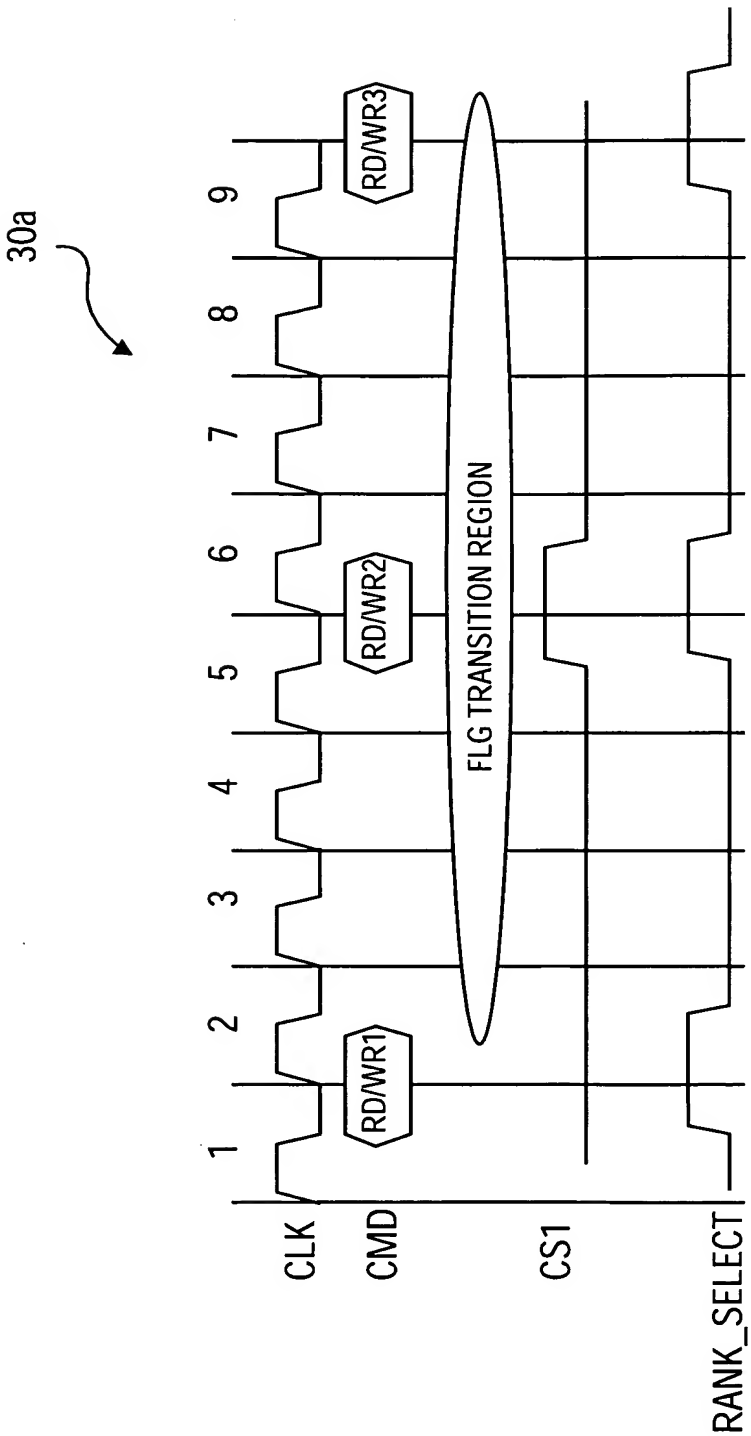
30a
1
2
3
4
5
6
7
8
9
RD/WR1
RD/WR2
RD/WR3
FLG TRANSITION REGION
CLK
CMD
CS1
RANK_SELECT

FIG. 8

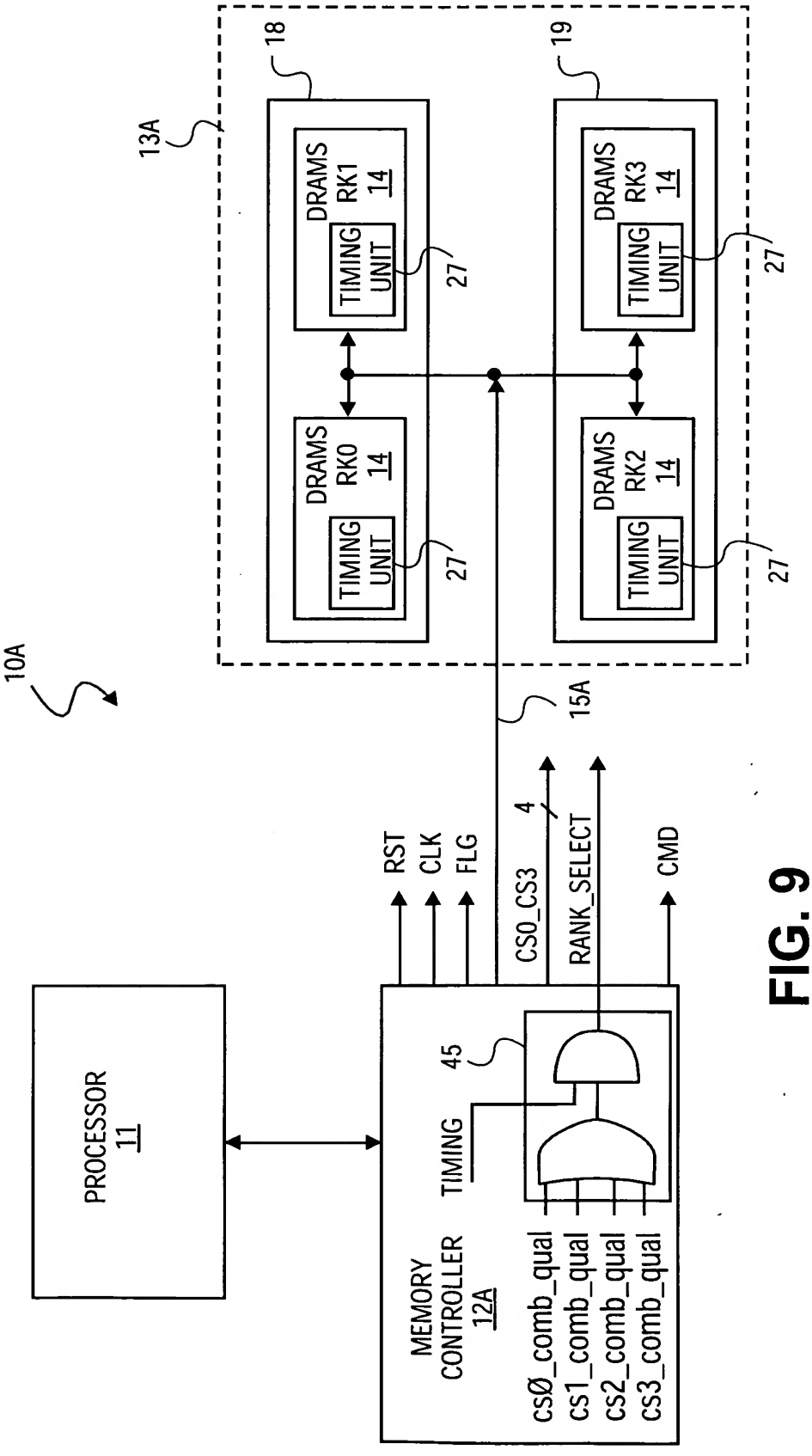
10A
13A
18
19
DRAMS RK1 14
TIMING UNIT
27
DRAMS RK3 14
DRAMS RK0 14
DRAMS RK2 14
15A
RST
CLK
FLG
CS0_CS3
4
RANK_SELECT
CMD
PROCESSOR 11
MEMORY CONTROLLER 12A
TIMING
45
cs0_comb_qual
cs1_comb_qual
cs2_comb_qual
cs3_comb_qual

FIG. 9

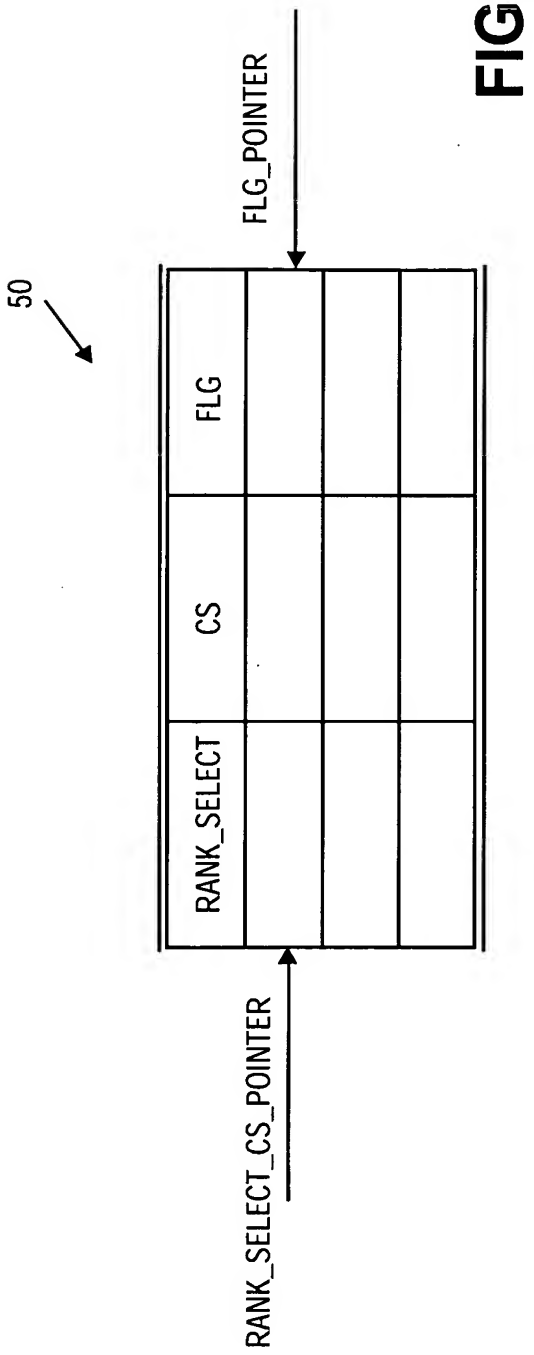

FIG. 10

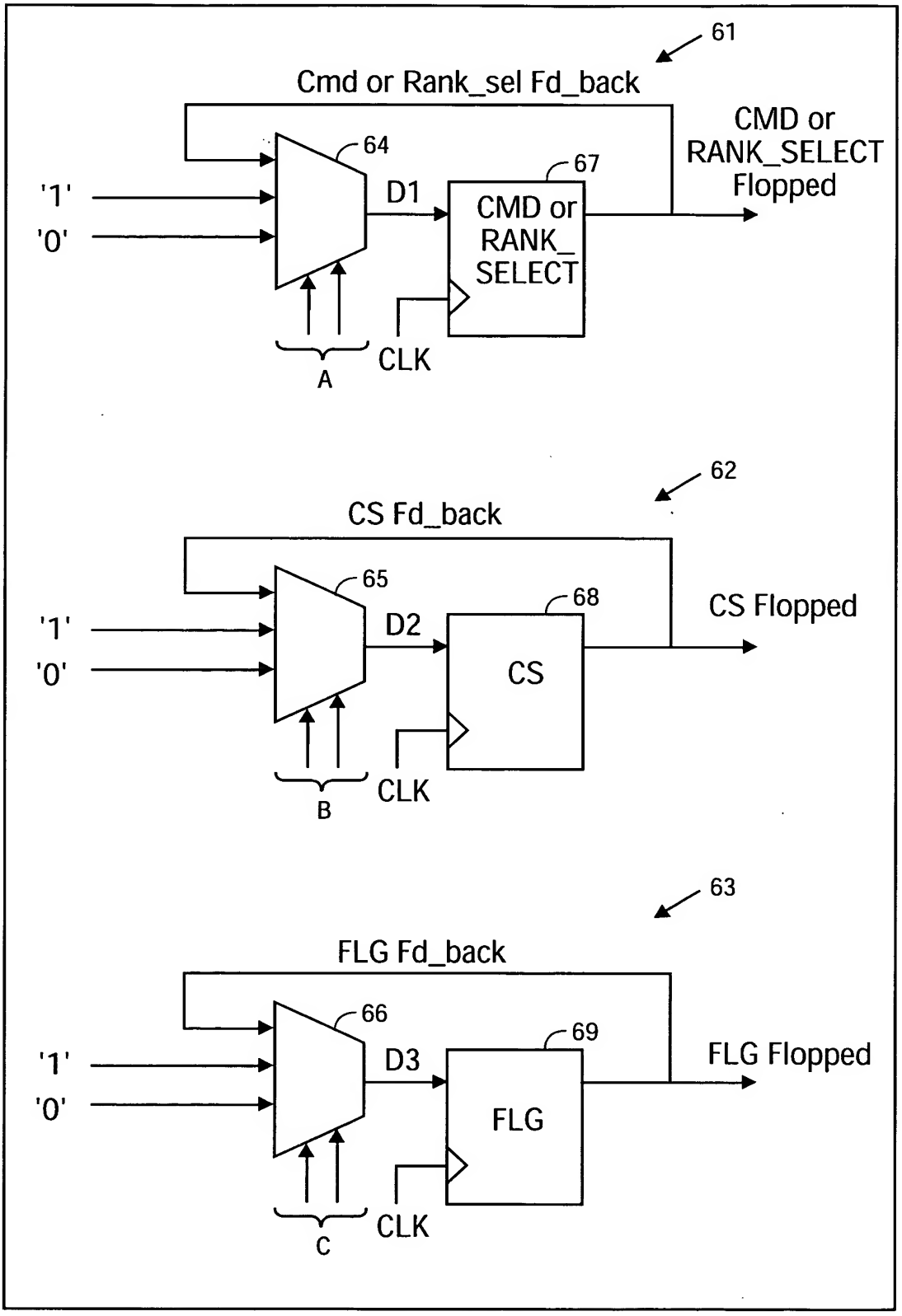
61
Cmd or Rank_sel Fd_back
64
67
'1'
'0'
D1
CMD or RANK_ SELECT
CMD or RANK_SELECT Flopped
A
CLK
62
CS Fd_back
65
68
'1'
'0'
D2
CS
CS Flopped
B
CLK
63
FLG Fd_back
66
69
'1'
'0'
D3
FLG
FLG Flopped
C
CLK

FIG. 11